PRINCETON ACM / IEEE-CS CHAPTERS
APRIL 2024 JOINT MEETING

Lifelong Learning at the Edge: Algorithms and Foundations

Lifelong Learning (or Lifelong Machine Learning) is an advanced Machine Learning (ML) paradigm: an architecture for ML systems that learn continuously, accumulate knowledge learned in the past, and use that knowledge to help future learning and problem solving. This talk will explore three aspects of Lifelong Learning.

First, traditional ML is generally an energy-hungry process: the process of building and training of the model requires huge computational resources. It might be expected that Lifelong Learning might be limited to cloud and off-line computing only. But this talk will explain some ways that Lifelong Learning avoids that constraint – by introducing a signal propagation approach that combines learning into the inference process, enabling the system to add classes to its knowledge model at the same time it is being used to solve problems.

Second, most ML approaches are limited in their ability to utilize temporal patterns in its computation. But in Lifelong Learning, there are some new mechanisms that can make the AI temporally aware, mechanisms which can improve the system's ability to work effectively with limited data as well as a significant savings in size and power usage.

Third, Lifelong Learning research continues to explore new models of computation – going beyond the traditional Turing computation model. Lifelong Learning researchers have been investigating "Super-Turing computation," a model of computation that resembles biological learning.

Dr. Hava Siegelmann is a Provost Professor of the University of Massachusetts, a Professor Computer Science, Core Member of the Neuroscience and Behavior Program, and the Director of the Biologically Inspired Neural and Dynamical Systems (BINDS) Laboratory. She conducts highly interdisciplinary research in next generation machine learning, neural networks, intelligent machine-human collaboration, and computational studies of the brain. Her current research is aimed at "third-wave AI," pushing for major innovations in AI design with a potentially dramatic increase in AI capability.

She was the recipient of the State of Israel's Alon Fellowship of Excellence, the NSF-NIH Obama Presidential BRAIN Initiative award, and the Donald O. Hebb Award of the International Neural Network Society for "contribution to biological learning." She was named as an IEEE Fellow, and Distinguished Lecturer of the IEEE Computational Intelligence Society, and an INNS Fellow. She received the DARPA Meritorious Public Service Award.

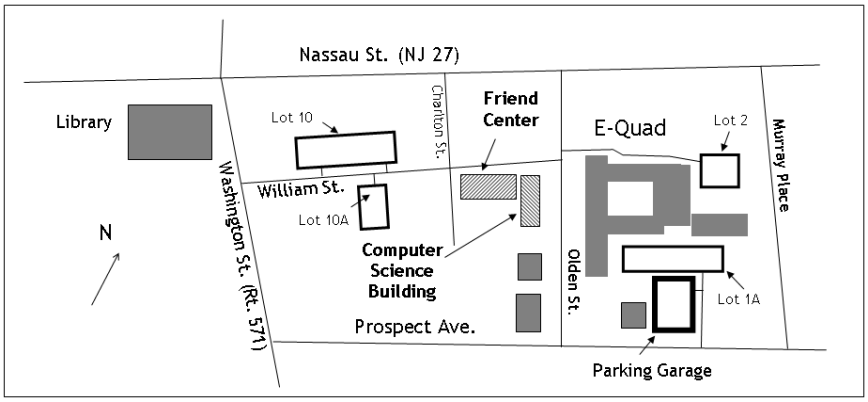
Dr. Siegelmann is a leader in increasing awareness of ethical AI via the IEEE, INNS, and international meetings. She is an active member, a founder director, and a chair in supporting minorities and women in STEM at the university level, both in the US and internationally.

Date: Thursday, April 18, 2024, 8:00pm EDT
Place: **HYBRID MEETING** (both in-person and online)
In Person: Princeton University Computer Science Building
Small Auditorium, Room CS 105
35 Olden Street, Princeton NJ
How to register for the online meeting:

- Send email to **PrincetonACM@gmail.com**
- OR Register on **Meetup.com** (**http://meetup.com/IEEE-Princeton-Central-Jersey-Section**)

Information: Dennis Mancl (908) 285-1066
On-line info: **http://PrincetonACM.acm.org**

All Princeton ACM / IEEE-CS meetings are open to the public. Students and their parents are welcome. There is no admission charge, and refreshments are served.



Parking: After 5pm on weekdays, public parking is permitted in most of the university parking lots near the Friend Center and the Computer Science Building. (Lots 10 and 10A are closest to the Friend Center). See **http://www.princeton.edu/transportation/visitors.html** for a summary of Princeton's policies.

On-street parking on Olden, William, and Charlton requires paying the meter until 8pm.